



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/810,694	03/29/2004	Shinji Himori	250832US2XCONT	1192
22850	7590	12/15/2006	EXAMINER	
C. IRVIN MCCLELLAND OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314			CROWELL, ANNA M	
		ART UNIT	PAPER NUMBER	1763

DATE MAILED: 12/15/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/810,694	HIMORI ET AL.	
	Examiner	Art Unit	
	Michelle Crowell	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 27 September 2006.
- 2a) This action is **FINAL**. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1 and 4-8 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 1, 4-8 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____. |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____. | 6) <input type="checkbox"/> Other: _____. |

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1, 4-6, and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al. in view of Westendorp et al. (U.S. 5,565,036), Suemasa et al. (U.S. 6,089,181), Fukasawa et al. (U.S. 5,342,471), and Brasseur (U.S. 5,298,466).

Referring to Figure 9 and column 5, lines 34-43, Kim et al. discloses a plasma processing apparatus comprising: a vacuum chamber 10 in which predetermined processing is to be applied on a substrate 13 to be processed by action of plasma on the substrate to be processed, inside of the vacuum chamber being airtightly closable (col. 2, lines 9-11); a bottom electrode 92 provided in said vacuum chamber and configured to have the substrate to be processed placed thereon (Fig. 9); 10 a top electrode 11 provided to face said bottom electrode (Fig. 9); a processing gas supply mechanism 21 configured to supply predetermined processing gas into

said vacuum chamber (Fig. 2, col. 48-52); a first radio-frequency power source 96 configured to supply a radio-frequency power with a predetermined first frequency to said bottom electrode 92; a second radio-frequency power source 97 configured to supply to said bottom electrode a radio-frequency power with a second frequency; a first power feeder being configured to feed the radio-frequency power with the first frequency to said bottom electrode from a center portion of said bottom electrode (Fig. 9 and col. 5, lines 34-39); and a second power feeder being configured to feed the radio-frequency power with the second frequency to said bottom electrode from an outer peripheral portion of said bottom electrode (Fig. 9 and col. 5, lines 34-39).

Kim et al. fail to specifically teach that the second frequency is lower than the first frequency.

Referring to Figure 7 and column 10, lines 42-53, Westendorp et al. teaches a plasma processing apparatus wherein the second frequency 90 of 400 kHz is lower than the first frequency 16 of 60 MHz since lower frequencies provide relatively high voltage across electrodes and thus generates high electron energies with a corresponding increase in ionization probability. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to operate the second radio-frequency power source of Kim et al. at a lower frequency than the first radio-frequency power source as taught by Westendorp et al. since lower frequencies provide relatively high voltage across electrodes which in turn generates high electron energies with a corresponding increase in ionization probability.

Kim et al. fail to specifically teach a first matching device and a second match device.

Referring to Figure 1 and column 4, line 62- column 5, line 11, Suemasa et al. teach a plasma apparatus having a first matching device 156 and a second matching device 144 . It is

well known in the art to use an impedance match network to provide efficient power transfer between the power supplies and the electrode. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the RF power supplies of Kim et al. with a first matching device and a second match device as taught by Suemasa et al. since it results in efficient power transfer between the power supplies and the electrode.

Kim et al. fail to teach a bottom electrode is supported on an insulator plate.

Referring to Figure 1 and column 2, lines 34-51, Fukasawa et al. teaches a plasma processing apparatus wherein the bottom electrode 12 is supported on an insulator plate 14. It is conventionally known in the art to support a bottom electrode with an insulator plate in order to prevent conduction between the bottom electrode and the chamber. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to support the bottom electrode of Kim et al. with an insulator as taught by Fukasawa et al. since this would prevent conduction between the bottom electrode and the chamber.

Kim et al. fail to teach a first matching device disposed in a space in the chamber.

Referring to Figure 1, Brasseur teaches a plasma processing apparatus wherein the matching device 6 is disposed in a space in the chamber. Additionally, the mere rearrangements of parts which does not modify the operation of a device is a *prima facie* obvious In re Japikse, 181 F.2d 1019, 86 USPQ 70 (CCPA 1950). In re Kuhle, 526 F.2d 553, 188 USPQ 7 (CCPA 1975). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the first matching device of Kim et al. in a space in the chamber since it is conventionally known and the mere rearrangements of parts which does not modify the operation of a device is *prima facie* obvious.

Art Unit: 1763

With respect to claim 4, first matching device of Kim et al. in view of Westendorp et al. and Suemasa et al. is electrically connected to said bottom electrode via a non-coaxially structured feeding rod (Fig. 9 of Kim et al.).

With respect to claim 8, the substrate to be processed is etched by the action of the plasma on the substrate to be processed (abstract).

4. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al. in view of Westendorp et al. (U.S. 5,565,036), Suemasa et al. (U.S. 6,089,181), Fukasawa et al. (U.S. 5,342,471), and Brasseur (U.S. 5,298,466) as applied to claims 1, 4-6, and 8 above, and further in view of Collins (U.S. 5,707,486).

The teachings of Kim et al. in view of Westendorp et al., Suemasa et al., Fukasawa et al., and Brasseur have been discussed above.

Kim et al. in view of Westendorp et al., Suemasa et al., Fukasawa et al., and Brasseur fail to teach the capacitance of the bottom electrode is set to 50 pF.

Referring to column 12, lines 2-6, Collins et al. teaches a plasma processing apparatus wherein the bottom electrode 32C has a capacitance value of 50 pF in order to diminish the losses due to the load mismatch (col. 11, lines 59-63). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention for the capacitance value of Kim et al. in view of Westendorp et al., Suemasa et al., Fukasawa et al., and Brasseur to be set to 50 pF as taught by Collins et al. in order to operate the bottom electrode at the desired parameters to diminish losses due to the load mismatch.

Response to Arguments

5. Applicant's arguments filed September 27, 2006 have been fully considered but they are not persuasive.

Applicant has argued that the advantage of having the **matching device disclosed in the space** is to reduce impedance and reduce inductance and capacitance components associated with feeding power to the bottom electrode; however, on page 11, par. [0042] of the applicant's specification, when a coaxially structured feeding rod is not used, the inductance and capacitance components are reduced (it is not due to the matching device being located in a space).

Applicant has argued that the matching network 6 of Brasseur is disposed in an exhaust pipe; however, the peripheral view of the chamber shows that the matching device 6 is located simply beside the chamber (or exhaust pipe as applicant claims), and it is not located in the exhaust pipe since that would cause deterioration of the matching device. Additionally, as seen in Figure 1 of applicant's invention, a portion of the matching device 14 is located in a space 13. Likewise, in Figure 1 of Brasseur, a portion of the matching device 6 is located in a space. Most conventional matching devices are located in open space. Therefore, the apparatus of Kim et al. in view of Westendorp et al., Suemasa et al., Fukasawa et al., and Brasseur satisfy the claimed requirements.

Applicant has argued that matching network 6 of Brasseur is clearly not located between an insulated plate and the bottom of a vacuum chamber; however, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). In the instant case, the apparatus

of Kim et al. in view of Westendorp et al., Suemasa et al., and Fukasawa et al. teaches a space located between an insulator plate 14 and the bottom of the chamber (specifically Fig. 1 of Fukasawa et al.). Brasseur was applied to teach that a matching network is located in a space. Therefore, the apparatus of Kim et al. in view of Westendorp et al., Suemasa et al., Fukasawa et al., and Brasseur satisfy the claimed requirements.

Applicant has argued that there is no mention of the advantage of the location of the network 6; however, the applicant's specification fails to give an advantage of the location of the matching network 14. Thus, the mere rearrangements of parts which does no modify the operation of a device is considered *prima facie* obvious. In the instant case, the matching device of Kim et al. in view of Westendorp et al., Suemasa et al., Fukasawa et al., and Brasseur will operate the same whether it is inside of a space or outside of a space. Therefore, the apparatus of Kim et al. in view of Westendorp et al., Suemasa et al., Fukasawa et al., and Brasseur satisfy the claimed requirements.

Conclusion

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michelle Crowell whose telephone number is (571) 272-1432. The examiner can normally be reached on M-F (9:30 -6:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Michelle Crowell
Patent Examiner
Art Unit 1763

pc
Parviz Hassanzadeh
Supervisory Patent Examiner
Art Unit 1763